

The Action continues to reject claims 1-9, 12, 13 and 15-19, the examiner arguing these claims are obvious by a combination of the teachings Jensen et al (WO 91/06292) and Langen et al (US Patent 3,595,676) to prepare low esterified pectins for the manufacture of the preparations according to the present invention.

Applicants respectfully submit this opinion of the Examiner is for the following reasons not correct:

The gastric juice resistant encapsulation of carotenoids according to the present invention is based on the manufacture of ionotropic gels, whereby non-dissociated carboxylic groups of two pectin chains crosslink by the addition of bi- and trivalent cations via the formation of calcium complexes. A precondition for the manufacture of the formulation according to the invention is, thus, the presence of low esterified pectin in dissociated form as well as sufficient water-soluble salts of bi- and trivalent cations. Though Jensen et al disclose in a list ("shopping list") nearly all known natural and partial as well as full synthetic hydrocolloids and thickeners, among them also pectin, with respect to the carrying out of the process according to the invention by Jensen et al essentially (examples 1-7 and 11-13) only the suitability of gelatines of different Bloom numbers, as well as of Gum arabicum (example 8), methyl cellulose (Methocel®; example 9) and starch (Capsul®; example 10) is disclosed exemplarily.

The suitability of pectin and especially of the pectin quality with a degree of esterification of below 50% as claimed by the present applicants is not disclosed. Since the comprehensive list of the polysaccharides and proteins listed by Jensen et al encompasses mainly those which are not suitable<sup>1</sup> for the formation of ionotropic gels, it is not obvious for the person skilled in the art to transfer the teaching of Jensen et al without any limits to the manufacture of the preparations according to the invention. A determination of *prima facie* obviousness requires a reasonable expectation of success. *See In re Rinehart*, 189 USPQ 143, 148 (CCPA 1976). In the present fact situation one of ordinary skill in the art would not have the comfort of reasonable

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<sup>1</sup> An important consideration in determining obviousness is "teaching away" from the claimed invention by the prior art. *In re Dow Chemical Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988). A reference teaches away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. A reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *see also KSR*, 127 S. Ct. at 1739-40 (explaining that when the prior art teaches away from a combination, that combination is more likely to be nonobvious).

expectation of success. A stimulation for the manufacture of such formulations on basis of the list of Jensen et al can, thus, be excluded, the more so as hints leading to the necessary additives (water-soluble salts of multivalent cations) are not part of that teaching.

Langen et al propose the use of special pectins with a middle to low degree of esterification (DE = 60-38) for the manufacture of a granulated gelling agent, whereby sugar and pectin are brought finely milled onto sugar crystals. An essential part of this recipe are fruit acids. In the preferred embodiment the recipe is composed of 34% low and middle esterified pectin, respectively, 34% finely milled sugar and 32% finely milled fruit acids such as citric acid or tartaric acid.

In contrast to the teaching disclosed by Langen et al, the addition of bi- and trivalent cations, respectively, in form of calcium, magnesium or aluminum salts is necessary for the manufacture of preparations according to the present invention to obtain microcapsules. The addition of citric or tartaric acid in the concentrations as mentioned would prevent the formation of a gel, since the galacturonic acid molecules in the low esterified pectin would be protonated to a large extent and, thus, would be present in non-dissociated form. Accordingly, no ionotropic gel can be formed. Furthermore, citric acid as well as tartaric acid form hardly soluble citrates and tartrates in the presence of calcium ions, so that an interaction between the bivalent ions and the dissociated carboxylic groups of the galacturonic acid which is necessary for the gel formation is prevented. From this it follows that the anyway not obvious combination of the teachings of Jensen et al and Langen et al would not lead to a product according to the invention. In other words, the combination of the fair teachings of both references would not result in the subject matter defined in applicants' claims. In contrast, the combination of both teachings would even result in a precipitation of the calcium salts of the fruit acids and of the low esterified pectins (polygalacturonic acid), again further evidence of lack of success.

With this background the combination of the teachings disclosed by Jensen et al and Langen et al is for the person skilled in the art even prohibitive for the manufacture of formulations according to the present invention.

Consideration of this response is solicited. Should the examiner require further information, please contact the undersigned.

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Respectfully submitted,

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